Northumbria Research Conference 2011. Day One, Thursday 5th May 2011

Equating steel and synthetic fibre concrete post crack performance to BS EN 14651:2005+A1:2007

Alan Richardson

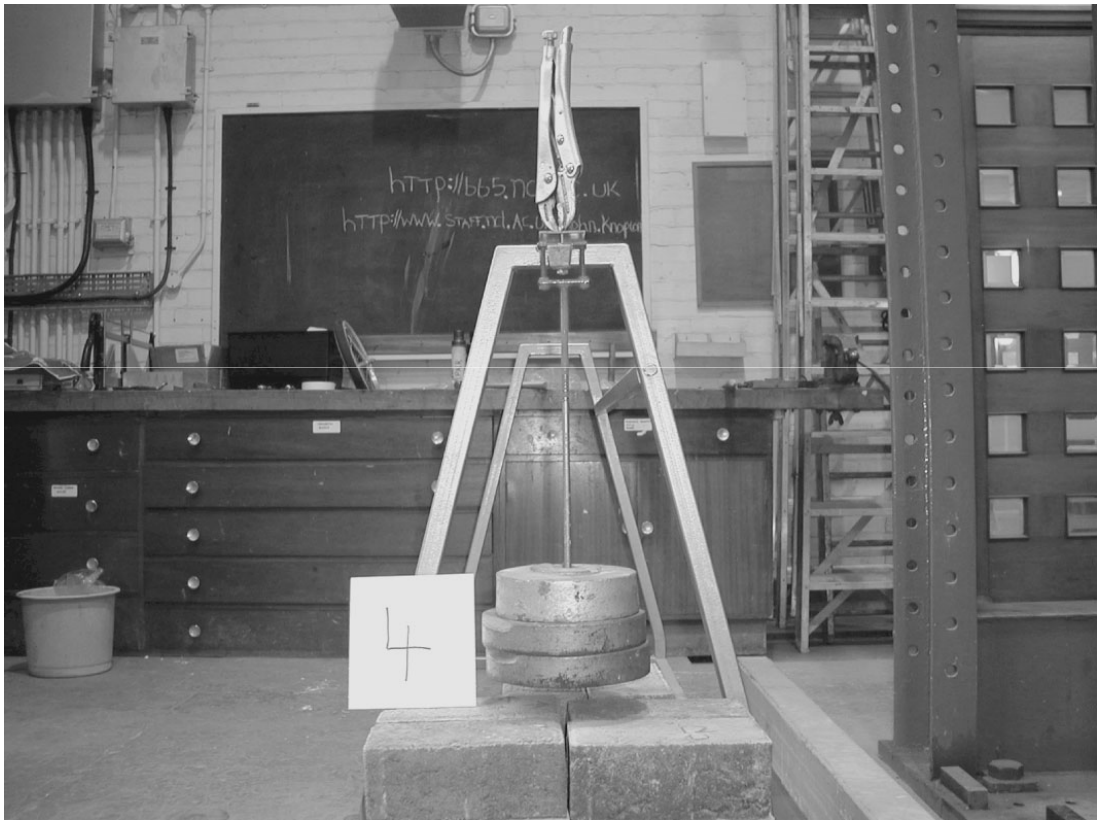
The problem?

- Establishing toughness performance in concrete using steel fibres is well understood and design guides are available to assist with this process. What is less readily understood is the use of Type 2 synthetic fibres to provide toughness. This problem is exacerbated by the wide range of synthetic fibres available, with each different fibre providing different structural/material properties

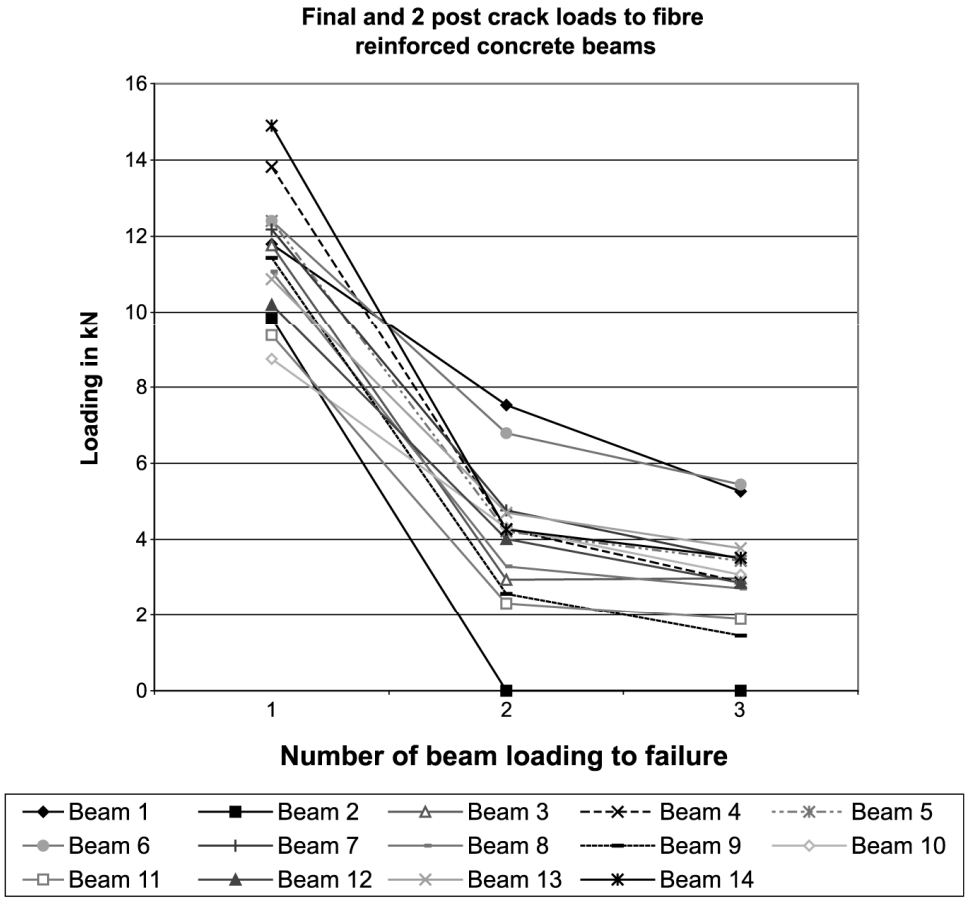
Previous work in 2005

- Research paper - Bond characteristics of structural polypropylene fibres in concrete with regard to post-crack strength and durable design

Pull out testing at Newcastle University single steel fibre under load



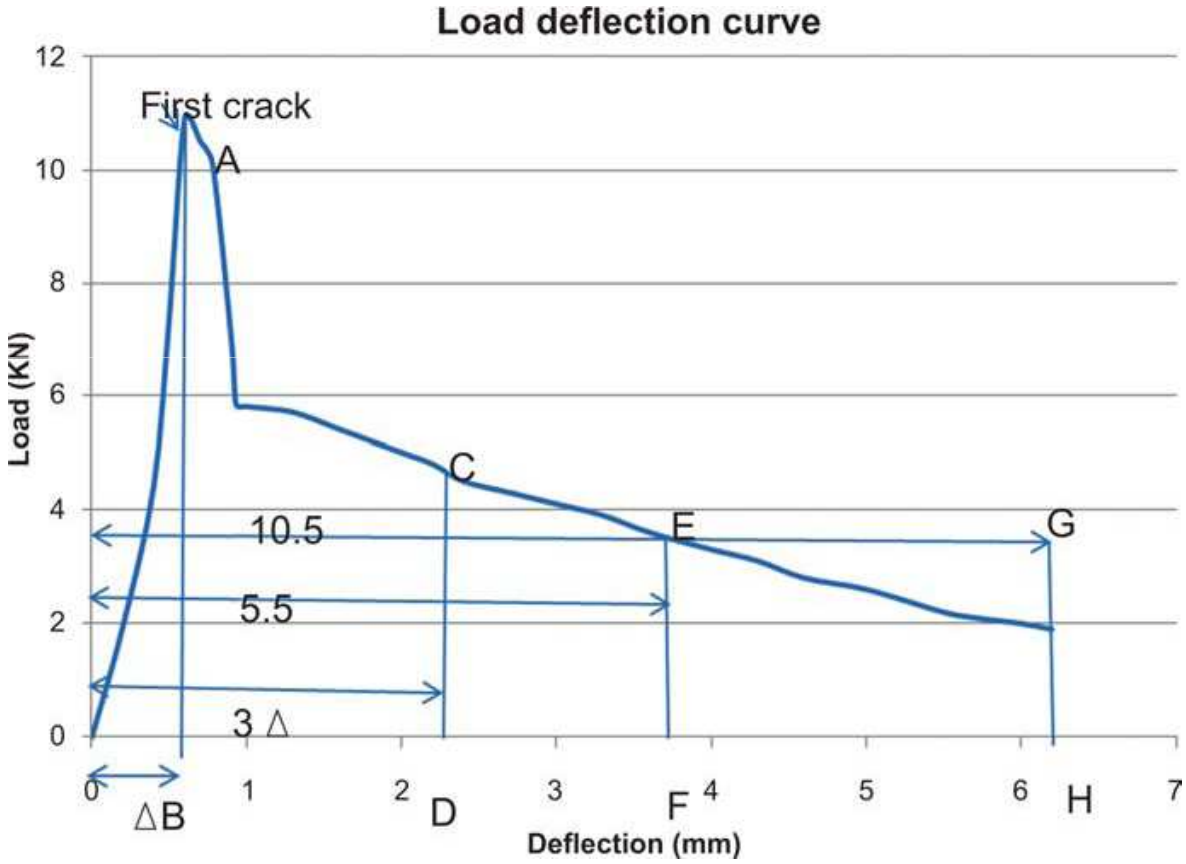
Post crack load before the current BS



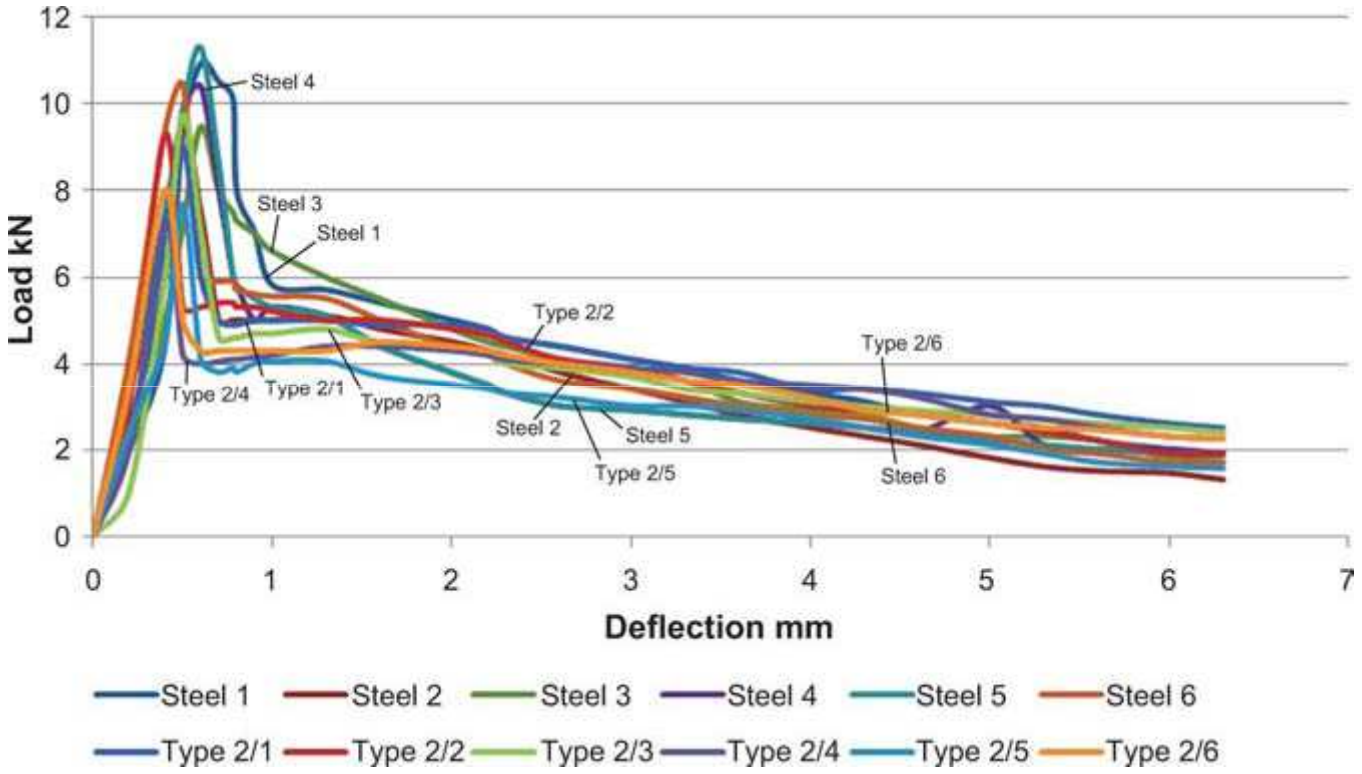
Previous work in 2010

- Synthetic and steel fibres in concrete with regard to equal toughness, tested to ASTM 1018 with examines load under a curve as a classic interpretation of toughness

Three toughness indices



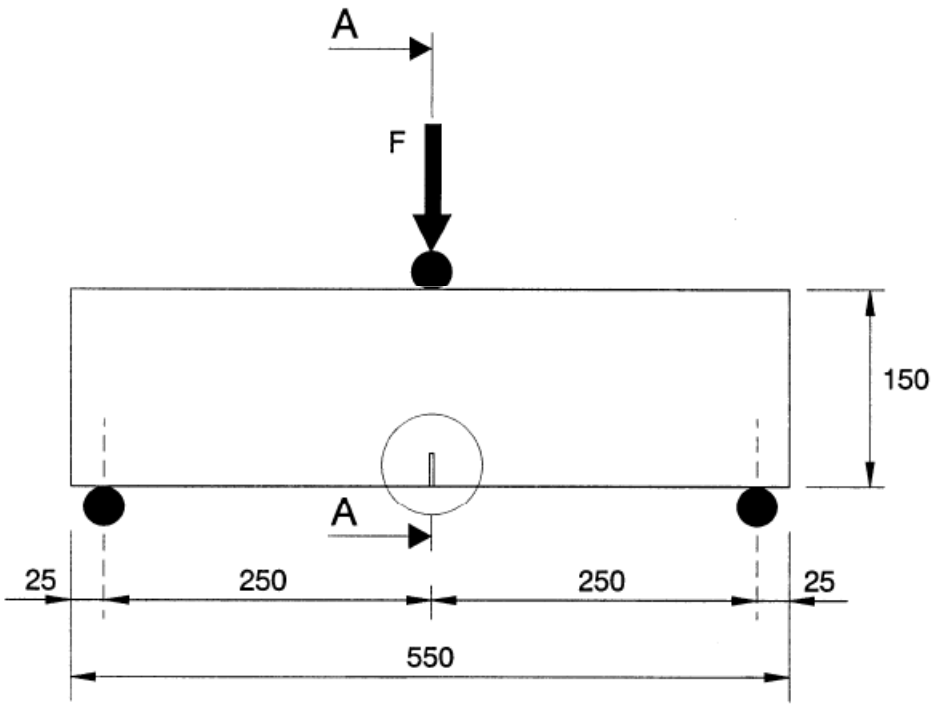
Equating steel and synthetic fibre performance



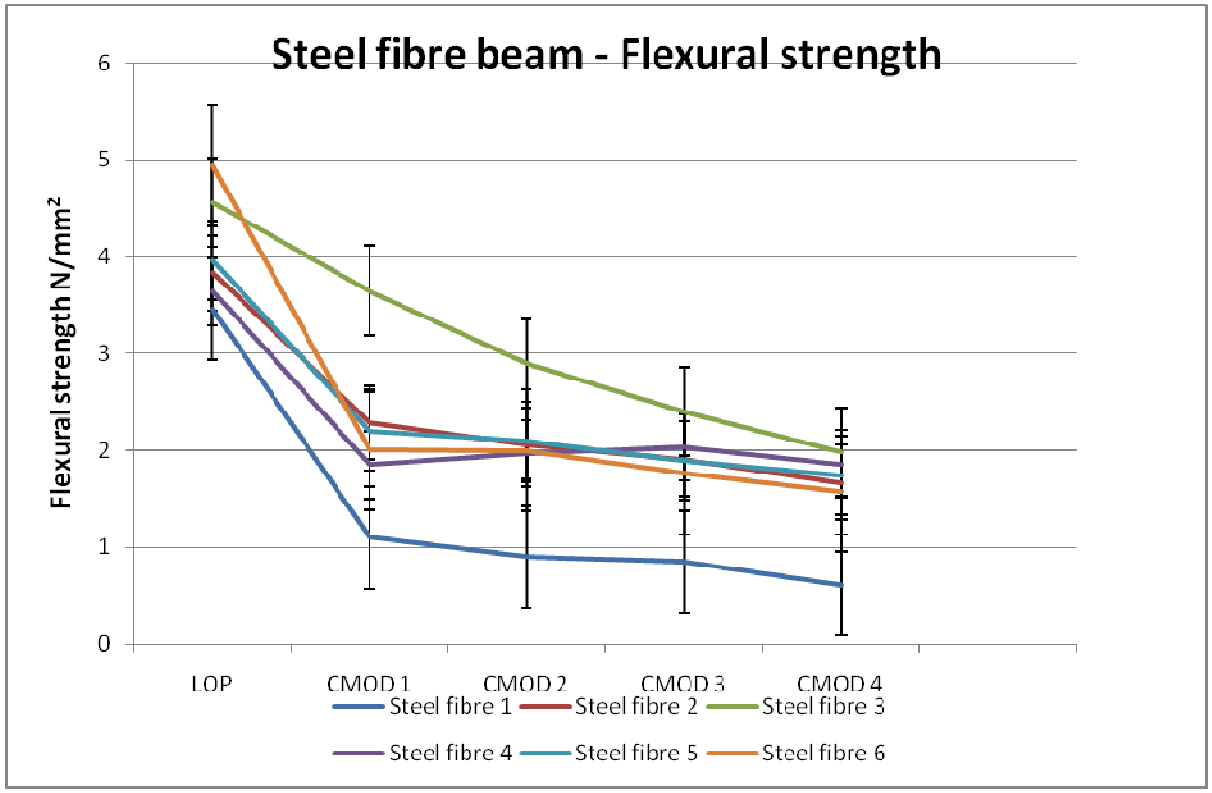
Recently completed work 2011

- *Equating steel and synthetic fibre concrete post crack performance to BS EN 14651:2005+A1:2007*

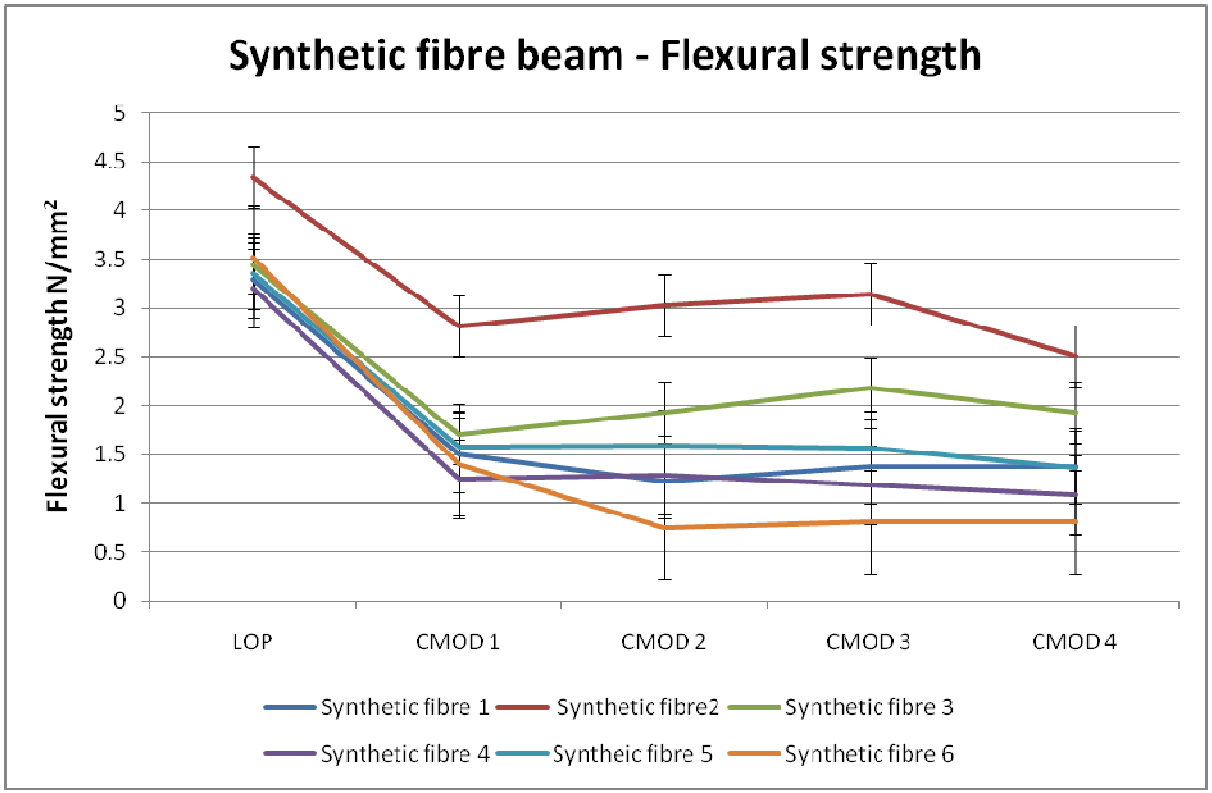
CMOD



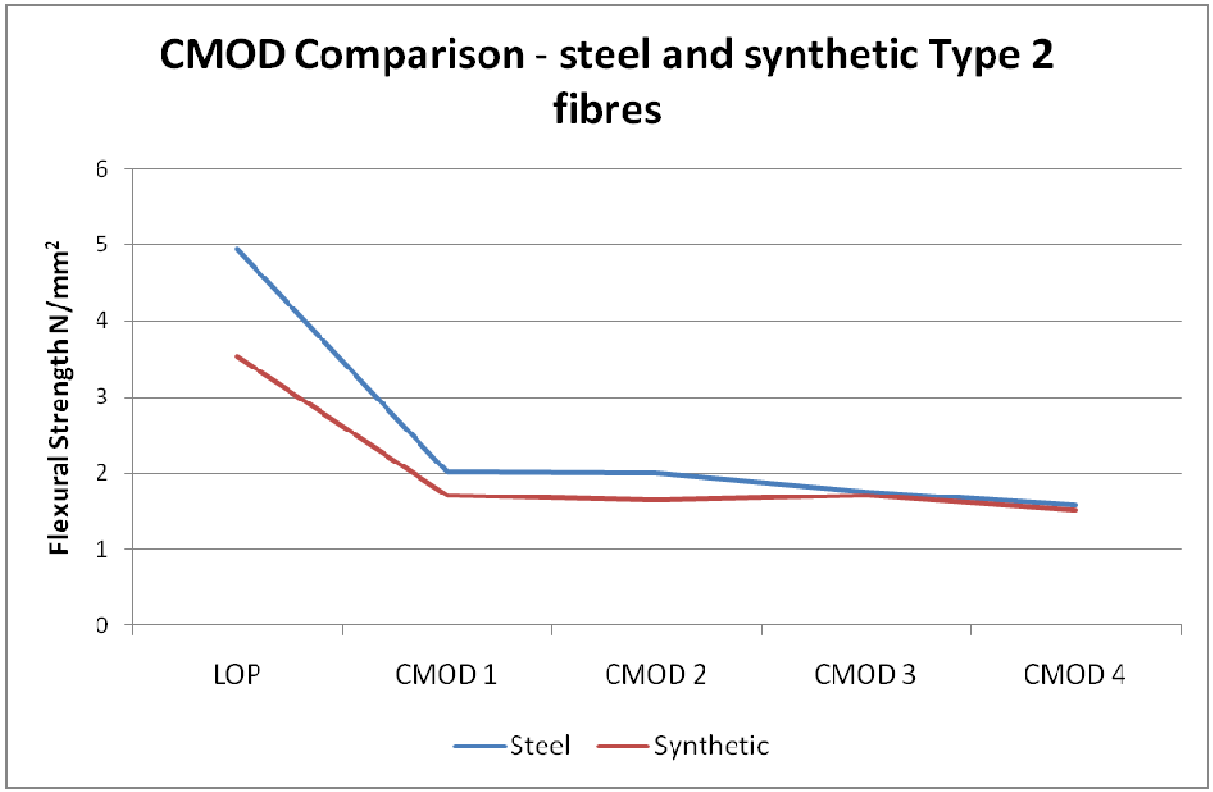
Steel fibre


Steel fibre beam - Flexural strength
Flexural strength N/mm²
6
5
4
3
2
1
0
LOP
CMOD 1
CMOD 2
CMOD 3
CMOD 4
Steel fibre 1
Steel fibre 2
Steel fibre 3
Steel fibre 4
Steel fibre 5
Steel fibre 6

Synthetic fibre



Comparison


CMOD Comparison - steel and synthetic Type 2 fibres
Flexural Strength N/mm²
6
5
4
3
2
1
0
LOP
CMOD 1
CMOD 2
CMOD 3
CMOD 4
Steel
Synthetic

Conclusion

- This work has informed the formation of a new standard for floor slab design
- Future work building on this research is ConFib – blast resistant concrete